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ABSTRACT

This study evaluates the extent to which the escalation of the labor demand, the transformation of work culture, and the diversification of the professional characteristics of the World Wide Web profession have attracted women to enter in to this new branch of information technology (IT) occupations. The study focuses on Web designers at the University of Freiburg (Germany). Specific objects are: (1) to identify the demographic and organizational profile of the participants in the Web environment in the sample university; (2) to assess the situation of men and women in the working practices (Web development, database management, graphic designing, server support, coding and programming, creation and maintenance of Web pages, content development, etc.) and working environment (computer center, administration, library, and academic departments/faculties); and (3) to explore whether there exists gender differences in educational attainment, skill equipment, and acquaintance with technological infrastructure (multimedia workstations, hardware, and software). Findings related to the Web designers are presented in the following areas: demographic profile; organizational profile; occupational profile; knowledge/subject base; task profile; skill profile in the areas of creativity, management, and technical work; gender difference in the perceived and actual application of skills; and acquaintance with the IT infrastructure. (Contains 13 references.) (MES)

Participation of Women in the Web Development in the Universities: A Case Study

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PARTICIPATION OF WOMEN IN THE WEB DEVELOPMENT IN THE UNIVERSITIES: A CASE STUDY

Abstract:

This study makes an evaluation of the extent to which the escalation of the labour demand, the transformation of work culture and the diversification of the professional characteristics of the web profession have attracted women to enter into this new branch of IT occupation. It examines the role being played by the male and female workers in the creative, technical and management areas of web designing. It analyses the gender differences and similarities in the pattern of knowledge and skill acquisition in the web related technologies. Further it investigates the trends in the preconceived ideas of gender roles in the web based occupations.

1. INTRODUCTION

Web design as a profession is marked by rapid commercialisation and technical changes since 1995[1] and the demand for the web professionals is getting accelerated in the recent years both in the commercial and institutional sectors[2]. This new unexplored expansion of web work in the universities demands an evaluation of members participating in the web team of the university; the role and responsibilities of male and female participants in the web development; their professional and academic background; their training and exposure in the area of web designing; their motivation to entry into this new area of work, the nature of tasks they undertake in their respective departments and their overall contribution to the web project of the university. The aim of our study is to explore the situation of men and women in web designing in a public institution and to examine the extent to which this new technology breaks or reinforces the gender division of labour. It attempts to analyse the preparedness of men and women to take up technological route by taking into consideration of their educational, skill and training background. Further it tries to see the role of women as the designers or creators of this new technology rather than disempowered users of this technology for business, entertainment, and educational purposes. It also examines how far universities as public organisations foster equal opportunities for men and women in the field of web related works. In short, our study focuses its attention on women's participation in the web media from the gender technology and organisational perspectives on the basis of a case study.

2. OBJECTIVES

The specific objectives of this study are listed below.

(i) To identify the demographic and the organisational profile of the participants in the web environment in the sample university

(ii) To assess the situation of men and women in the working practices (web development, database management, graphic designing, server support, coding & programming, creation & maintenance of web pages, content development etc) and working environment (computer centre, administration, library, & academic departments/ faculties)

(iii) To explore whether there exists gender differences in educational attainment, skill equipment, and acquaintance with technological infrastructure (multimedia workstations, hardware & software).

3. METHODOLOGY

Our study focus its attention on the web designers in the University of Freiburg, Germany. An inventory of these workers were collected both from the Internet and also from personnel list maintained in the computer section of the university. The total population of the web designers is 156 among which male members are 128 and female members are 28. The entire web designers were contacted with a request for participation in our survey but only 58 of them expressed their willingness to take up our survey. Thus the participation rate of the respondents is 37 percent. Among those accepted to take up the survey, 45 are men and 13 are women. The period of the survey is April-May, 2001. The data are collected by contacting each one of the respondents in the various academic departments, administrative sections, library and the computer centre during their leisure time . A questionnaire covering aspects related to the demographic, educational and the skill profile of the male and female web professionals was used in the face to face interviews. It also included career related aspects such as motivation for the choice of this work, mode of work, assignment of tasks, nature of training, organisational environment, acquaintance with the technological infrastructure, career prospectus and the problems encountered. Data analysis was then carried out using SPSS6.

4. DATA ANALYSIS

In order to examine the various issues raised in the objectives, we have conducted a descriptive analysis of the data collected. As the size of the population of the male and female respondents of our study is unequal, both the groups are treated as a separate population in the analysis. The following section illustrates the status of men and women in the web environment of the sample university.

5. DEMOGRAPHIC PROFILE OF THE WEB DESIGNERS IN THE SAMPLE UNIVERSITY

The demographic pattern of our sample reflects that web team of the university comprises of largely male, young and highly qualified members. Despite the fact that web profession accommodates more women than

the other IT professions[3], we could notice from our sample that the representation of women in this area of work is limited. This might probably reflect the general trend prevailing in the university where the women population is relatively lower than their male counterparts in the IT occupations. As far as the age and academic qualifications are concerned, both men and women are on the equal level. This again reinstate the fact that the web team of the sample institution consists mostly of the youngsters with high academic background. It is generally argued that academic qualification is not essential for taking up web related jobs, but in the context of producing web content, the importance of the academic training as an 'add on' is realised.

6. ORGANISATIONAL PROFILE OF THE WEB DESIGNERS

The organisational pattern of the respondents reflects the web team composition of the major units (faculties, computer centre, administration, library and other centres) in the university. The size of the web team varies significantly among the different organisational units (faculteis = 57% , computer centre=12%, administration=12%, the library =10%) which gives rise to the argument that those units that engage more people, register greater progress than those that engage less people towards web based activities. The web team of the faculty of informatics and applied sciences is larger than the other faculties which is to some extent reflective of the availability of local expertise/human resources in these faculties. There are distinct differences in the distribution of men and women web professionals across the various units and faculties. There is no representation of women in the web team of the computer centre, while the participation of men are higher in this unit. Also, in units which are commonly considered as women's area of work like the administration and library, the web team members are mostly men. Within the faculties, men web professionals are seen largely in informatics while women are seen in applied sciences. The distribution pattern of men and women among the various units and faculties to some extent coincide with their subject background.

7. OCCUPATIONAL PROFILE OF THE WEB DESIGNERS

The occupational pattern of the web team (Table 1) consists of members from diverse areas of organisational (units/faculties)and occupational categories (job positions). Overwhelming involvement of professionals from all cadres and ranks may be due to the fact that to acquire skills in web designing is considered as an 'add on' for their professional development. This trend has marked the emergence of the new working culture in the university that necessitates the close collaboration of diverse professionals all working within a highly co-ordinated and structured development process in order to achieve the common cause of creation of the university web sites. Gender analysis reveals a distinct difference in the occupational background of the male and female members taking part in the web team of the university. Our sample shows that the web team composed of a larger percentage of men from the computing and the teaching occupations and women from the administrative occupations. The above result seems to support the assumption that web designing is receptive to men and women from both high-tech and non-high tech background.

TABLE 1 : OCCUPATIONAL PROFILE OF THE RESPONDENTS

A. ACADEMIC	M=14 (31%)	F=2 (15%)	**C. LIBRARY**	M=4 (8%)	F=1 (8%)
Professors	6 (13%)	1 (8%)	Section Heads	3 (7%)	1 (8%)
Associate Professors	6 (13%)	0 (0%)	7. Assistent Heads	1 (2%)	0 (0%)
Assistent Professors/ Scientific Assistent	2 (4%)	1 (8%)			
B. ADMINISTRATIVE	M=1 (2%)	F= 7 (54%)	**D. COMPUTING**	M=26 (57%)	F=3 (23%)
			8. Team Leader	3 (7%)	0 (0%)
Associate Heads	1 (2%)	4 (30%)	9. Manager-IS	1 (2%)	0 (0%)
Assistent Heads	0 (0%)	3 (23%)	10 Coordinator IS	1 (2%)	0 (0%)
			11 System Administrators	7 (16%)	0 (0%)
			12.Web Professionals	7 (16%)	1 (8%)
			13. Student Consultants	7 (16%)	2 (15%)

8. KNOWLEDGE/SUBJECT BASE OF THE WEBDESIGNERS

Regarding the knowledge/subject base of the respondents, our analysis shows that in majority of the cases, women represent the non-technical group of the web team. The indispensability of the non-computer professionals in this occupation has been invariably noted from the studies. As web profession is both an art and a science[4], it involves both the creative (design) and the constructive (navigation, performance and administration) activities and therefore the need for specialists combining these two areas are required. It is noted from our sample that woman have a strong knowledge base in various arts, information science, social science and science subject background while men have background in the computing and allied subject fields indicating that the web team of the university has the necessary input for the creative and constructive areas of work.

TABLE :4 SUBJECT BACKGROUND OF THE RESPONDENTS

S.NO	SUBJECT BACKGROUND	MALE	FEMALE	TOTAL
1.	Liberal Arts and Languages	2 (4%)	0 (0%)	2 (3%)
2.	Library & Information Science	2(4%)	0 (0%)	2 (3%)
3.	Social Sciences	13 (28%)	8 (62%)	21 (35%)
4.	Biological & Medical Sciences	2 (4%)	4 (30%)	6 (10%)
5.	Computer Sciences	18 (40%)	1 (8%)	19 (33%)
6.	Physical Sciences	9 (20%)	0 (0%)	9 (16%)
	Total	45 (100%)	13 (100%)	58 (100%)

9. TASK PROFILE OF THE WEB DESIGNERS

With respect to the work pattern of the participant in the web environment, gender equity is maintained. The representation of women is noticed in some of the traditional (technical) male areas of work like web implementation, creation of web based databases, web server support, and coding & programming (see Table 5). The representation of men in some of the women's area of work namely web page creation and content development is also seen. Though the male and female domains of work were well documented, the present study shows a slight deviation from the traditional role playing by men and women in their area of work. The presence of men and women are noticed in both areas of work and the gender differences with respect to the work domains are marginal (see Table 5). The roles or assignments of tasks taken by the gender groups give the impression that web development is neither a male's or a female's domain but it is a genderless area of work where both men and women with creative and technical knowledge could work.

TABLE: 5 TYPES OF TASKS UNDERTAKEN BY THE RESPONDENTS

SNO	TASKS	Male	Female	Total
1.	Web applications/implementation	4 (9%)	1 (8%)	5 (9%)
2.	Creation of web based databases	5 (11%)	2 (15%)	7 (12%)
3.	Designing graphics, animation and flash	3 (7%)	0	3 (5%)
4.	Web server support	6 (13%)	2 (15%)	8 (14%)
5.	Coding and programming	3 (7%)	1 (8%)	4 (7%)
6.	Web page development and maintenance	18 (40%)	3 (23%)	21 (36%)
7.	Content development	6 (13%)	4 (31%)	10 (17%)
	Total	45 (100%)	13(100%)	58 (100%)

10. SKILL PROFILE OF THE WEB DESIGNERS IN THE AREAS OF CREATIVITY, MANAGEMENT AND TECHNICAL WORK

An overview of the skill patterns of the respondents in the area of creativity shows that the concentration of majority of them seemed to be on a few areas of skills like creation of web pages and content designing. This convergence of attention on developing skills proficiency in certain areas can be viewed from two different perspectives: one is from the nature of the work (demand for work) and the other one is from the people involved in this work. As far as the nature of work is concerned, the universities are going in for a simple web sites that contain information in the form of texts and graphics (not flashy and highly technical). All those who know how to create and edit hypertext along with a basic knowledge of scripting (e.g. CGI, Java, perl, c and unix shell scripts) graphics application techniques (e.g photoshop, fractal painter and 3D modelling) and TCP/IP networking could perform the job of a web page designer efficiently[5]. Similarly, content creation requires both creative as well as technical and operational skills and it is stated that such skills could be acquired on the job. With respect to skills like animation, interface designing and illustration which requires a long training and practice most of the respondents have remarked that they cannot afford to invest their time on these areas since they are neither rewarding nor being considered as essential for performing their main job. In this context, it is worth considering the nature of the web development process in the university atmosphere. It is undertaken not as an exclusive profession of the staff and students, but it is taken as part of their other regular assignments. Probably that might be the reasons why the proportion of respondents having proficiency in certain skill areas which are on the high demand in the industry labour market like animation, illustration and graphic designing are only moderate in the university. The lower proportion of participants on the transferable skills (art directing, directing and video film production) suggests the diminishing demand for those skills in web designing since these roles have been taken up by the web designer. Considerations for the lay out, texts, images and graphics, determinations of the volume of digital information on a single page, the layers and sub layers, and the links etc governed by the web page designer. Therefore specialised skills in art direction and direction is not considered as important by the participants. Among the female respondents, invariably the percentage of women possessing some of the emergent (web designing-92%)and convergent (content designing- 85%) creative skills are higher than their male colleagues.

Therefore, one could argue that women's expertise in certain creative skills in web designing help them to gain wider access to the web development.

With respect to the level of application of creative skills on current work by men and women, the latter seemed to score a higher level which coincide with the theoretical assumption that women are competent in the creative skills[6] and the artistic element required for web related works. It also seems to support the statement that 'the intellectual/creative arena' which forms the core of the web profession is 'becoming more of a level playing field'[7] and the web is considered as an equaliser and ideal medium for women to make progress[8]

Regarding women's proficiency in the managerial skills especially in the area of planning web sites confirm the general assumption that women score well as managers in the decentralised organisations where team work and delegations are considered as the key.[9] The lower application of the managerial skills in the areas of financial, advertising and copyright by the respondents could be justified on the ground that universities are still in the initial stage of the web development activities, and therefore, the need for holistic and strategic web production management skills may not be required at this juncture. As the skill requirement goes with the stage of web development, the need for people with specialised management skills may be required in the future. Gender difference is noticed in the pattern of skill development in the different managerial areas. Women seemed to show proficiency in the web planning and product management, while the male seemed to show efficiency in the areas of web promotion activities, copyright information management and financial management.

The higher score of male respondents in all the technical skill areas of web designing reconfirm the predominance of male in the technical areas of work especially in the digital media work[10]. Studies also have reported the lower visibility of women in the technical areas of multimedia and web industries. It is suggested that women's lower representation in technical areas is a result of the gendered nature of the prior industry practices in information technology and media production[11] In the present context, the lower representation of women in the technical areas may be attributed to the fact that majority of the female participants of this study are from the social science background (60%) and therefore their proficiency in the technical areas are relatively lower. However, programming skills alone is not the be all and the end all of this profession. It needs a proper blend of programming skills with sufficient proficiency in content development and production techniques. In that respect, women have the necessary skill base to participate as active agents in the web designing process. The general trend prevailing among the web industry is that technical skills can be acquired where as the creative skills are rare and it is considered as a scarcest resource. In summary, the skill profile of the respondents reveals that a fairly high proportion of men and women possess the skills needed to perform the work. The skill profile of the female respondents are higher in the creative (M=40%, F=49%) and management areas (M=28%, F=40%), while the male respondents are higher in technical areas (M=49%, F=34%) of work.

Table: Proficiency of the respondents in three major skills domains

S.No	Skill Domains	Male (%)	Female (%)
1.	Creative Skills	40%	49%
2.	Management Skills	28%	40%
3.	Technical Skills	49%	34%

The skill acquisition status of women in all the major areas of work gives the impression that they possess the necessary input to be an active agent in the web development in the university environment. The dominance of women in certain skill regions like creativity and management which are considered as the core areas of web designing makes one to assume that the scope of women to be the designer rather than just the user of this new technology are large. It is also reported that women seemed to have acquired a large share of the skills and characteristics relevant for the digital age[12].

11. GENDER DIFFERENCE IN THE PERCEIVED AND THE ACTUAL APPLICATION OF SKILLS

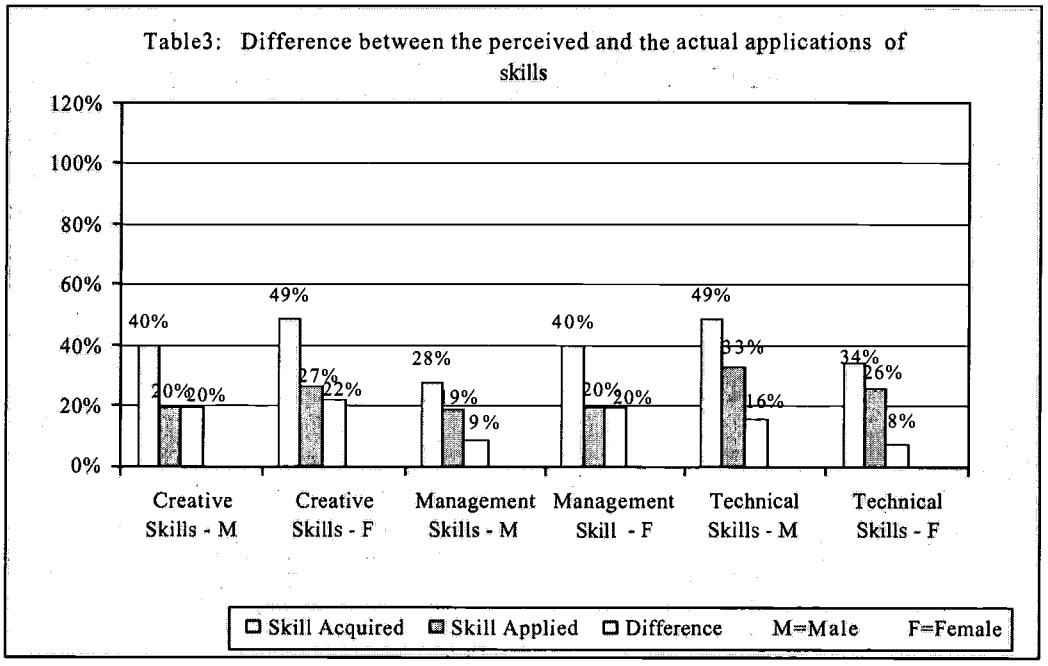
This study has also brought to light the difference between what the respondents perceive themselves to have skills in the creative, management, and technical domains and the level of applications (higher level) of those skills in their area of working.

It has demonstrated the difference existing between the skills acquired and the skills utilised in the field of work by the respondents. In the case of the female respondents this difference between the perceived and the actual use of the skill is very low in the technical skills while in the case of the male respondents this situation is found in the management skills. In all other areas of skills, the gap between these two phenomena is high for the male and female respondents.

The gap in the utilisation of the skills acquired by the respondents may be due to the lack of opportunity in the work area or due to want of time as most of the participants in the web areas of work are doing it as their

additional responsibility. It is presumed that as the web development project of the university is getting advanced/matured, the need for development and management of sites would become more complex, which might require full time professionals with specialisation in each branch of the web technology. In that context, the gap between the skill acquired and skill utilised would be narrow.

graph7: Difference between the perceived and the actual applications of skills



12. ACQUAINTANCE OF THE WEB DESIGNERS WITH THE IT INFRASTRUCTURE

The mastery in handling the technology and the familiarity with the hardware and software are considered as the essential parameter for the computing professionals. Tinkering with technology is one of the prime factors that determine the suitability of a person in the profession. This study has examined the level of acquaintance of the male and the female respondents in handling the multimedia hardware and the software associated with the web designing work. In the case of acquaintance with various workstations, a higher percentage of both male and female respondents have proficiency in handling windows 95 and windows NT. Gender difference is noticed only in the case of handling unix, in which case, the male respondents have higher proficiency than the female respondents. The same tendency is noticed in the case of handling the multimedia hardware where both the gender groups acknowledged a higher proficiency in handling flatbed scanner and the digital video cameras while the male members seemed to have gained high level expertise in handling the slide scanners. As far as the gender situation in the acquaintance with multimedia software is concerned, both the gender groups expressed a high level of acquaintance.

Gender Difference in Acquaintance with various Multimedia Infrastructure

Infrastructure	Male	Female
Workstation	Windows 95 (91%) Unix (80%) Windows NT (73%)	Windows 95 (85%) Windows NT (69%)
Hardware	Flatbed Scanner (83%) Digital Video Cameras (71%) Slide Scanner (60%)	Flatbed Scanner (85%) Digital VIdeo Cameras (61%)
Software	HTML Authoring (93%) Graphic Design (82%) Desktop Publishing (78%) Animation (64%)	HTML Authoring (85%) Graphic Design (78%) Desktop Publishing (85%) Presentation (69%)

The above results makes one to assume that female members of this study are no longer technophobes and they have already acquired confidence in handling the technology with ease.

CONCLUSION

Our study shows that like in any other IT profession in Germany, women are under represented in web designing also. This lower participation of women might be due to the fact that the voluntary, unpaid and time consuming nature of the web designing job might be conflicting with the family and child care responsibility of women in the university. As this job requires constant learning and training, most of the women might find it hard to patch up with their already demanding commitments in their work and home. The findings of our study reveals that it is not the gender but the subject background of the individuals influences their participation in the web team of the various organisational units in the university. Women's absence in the web team of the computer centre and their lower representation in the web team of the administration and the library coincide with the lack of women professionals with computing background. Among the 50 percent of web professionals with the computing background in our sample only 5 percent are women. Since majority of the women have the subject background in science, their participation is visible in the web team of the biological sciences. It is seen from our study that the web development work requires both tech and non-tech professionals which encourages women with non-tech background also to get into this sphere of work. However, as the web matures, it would require professionals with more of technological background which could imply that the demand for non-technical professional is short-lived. A similar situation existed in the software industry during the 80s, when it was at the stage of infancy. As it advanced, it focused more on engineering and technological professionals rather than on non-engineering professionals [13]. It implies the technological orientation is required for women at a larger level to cope with the fast changing web media environment. Our study reveals the participation of women both in the creation web pages and in the implementation of the technologies signifying the equal opportunities prevailing in this work. Unlike in the software industry where there is concentration of women only in the bottom line of the occupational hierarchy, in web profession, the presence of women is seen in all job categories. Our study points out the gender difference in the skill development pattern of the male and female members. Men seemed to be proactive in developing skills in the technical areas while women on the creative and management areas. The most required skill demands for the web based occupations regardless of the industry segment are a combination of creative, management and technical talents for the next three to five years. In that context, women's opportunities seemed to be brighter in this occupation. The larger acquaintance of women with various computing platforms, multimedia hard ware and software gives the impression that they are no longer technophobes and prepare themselves to take the technological route with confidence.

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